

The Revolution in Health Care Antitrust: New Methods and Provocative Implications

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Context: In recent years, federal courts have permitted hospital consolidations and other potentially anticompetitive actions by accepting hospitals' claims that they compete in expansive geographic markets. Recent events, including two actions by the U.S. Federal Trade Commission, suggest that antitrust is undergoing a sea change, thanks in part to new methods for defining geographic markets. This article reviews the recent history of hospital antitrust, describes the methods used to define markets, and illustrates the new methods by considering two consolidations recently proposed by a New York regulatory agency.

Methods: The new methods for defining geographic markets rely on estimates from conditional choice models using patient-level hospitalization data. These estimates are the raw material for computations of price effects derived from a theoretical model of hospital pricing in a managed care environment.

Findings: Applying these methods to two proposed consolidations in New York shows that one of the mergers would likely raise prices by a substantial amount without the promise of offsetting efficiencies but that the other would not have this effect.

Conclusions: New methods for geographic market definition may fundamentally alter how courts will evaluate antitrust challenges. Although additional research is necessary to refine the predictions of these new methods, consolidating hospitals, as well as any other hospitals engaging in potentially anticompetitive conduct, can no longer anticipate a friendly reception in the courtroom.

Keywords: Health economics, hospital antitrust, hospitals, mergers.

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A FEW YEARS AGO, VIRGINIA'S INOVA HEALTH SYSTEM announced its intention to acquire Prince William Hospital in Manassas, Virginia. In reviewing the proposal, the U.S. Federal Trade Commission (FTC) performed a statistical analysis showing that the merger would increase market concentration in northern Virginia, and it included this analysis in its legal challenge to the acquisition. On June 6, 2008, Inova announced that it was abandoning the deal. This was the FTC's second "success" in two years. In 2006, the FTC persuaded an administrative law judge that the formation of the three-hospital Evanston/Northwestern Healthcare system had been anticompetitive. With this ruling in hand, the FTC might have asked Evanston/Northwestern Healthcare to divest Highland Park Hospital but, instead, imposed restrictions on how its member hospitals could set their prices. What is remarkable about these recent events is that they followed a fifteen-year "drought" during which the FTC and the U.S. Department of Justice (DOJ) attempted but failed to block at least six hospital mergers.

Today, however, health care antitrust enforcement appears to be undergoing a sea change. This is no accident. New research on a relatively obscure economic topic known as *geographic market definition* is arming regulators with powerful evidence that hospitals may possess far more market power (the power to set prices) than previous courts had acknowledged. In this article we describe this research and explain its importance to the U.S. health industry. We review the methodology that we introduced earlier in our published research, methods that the FTC used in the Inova case. Finally, we illustrate the methods by considering two consolidations proposed by a New York regulatory panel as part of a plan to restructure the state's health care.

Background on Hospital Antitrust

Like most branches of law, antitrust law evolves through a combination of legislation and court and agency precedents. Although there has been little legislative activity in the area of health antitrust, any changes in prevailing policies are likely to emerge in court and agency decisions. A brief review of the process and history of hospital merger cases highlights the importance of defining geographic markets and illustrates the

role that new theoretical and empirical techniques are likely to play in shaping future policy decisions.

Merger cases usually require two related analyses. First, the analysts must define the market. Second, they must compute the change in market concentration that will result from the merger. The latter is mechanical: once the market is defined, the plaintiff and defendant seldom report widely differing changes in concentration. Thus, the outcome of merger cases often depends on the market definition. In the specific case of hospital mergers, the key issue is the scope of the geographic market in which the hospitals compete. (An exception is made for retrospective reviews of consummated mergers, for which direct evidence of price increases may be sufficient to demonstrate market power, without needing to define the market.)

Throughout the 1980s when the government challenged a hospital merger, it generally prevailed. In a victory that antitrust agencies would soon rue because of the precedent it created, *U.S. v Rockford Memorial*, the issue of market definition turned on the results of “patient flow analysis.”¹ That analysis, based on a 1970s study of coal markets by Elzinga and Hogarty, measures the extent of patient inflows and outflows from a proposed geographic market (Elzinga and Hogarty 1973).² If both flow statistics are small (where the definition of “small” has varied from 10 to 25 percent), the market is deemed to be well defined, based on the assumption that if few patients travel outside the proposed market for care, the area must not have many alternative providers. The hospital mergers contested by the FTC and DOJ during the 1990s tended to involve smaller metropolitan areas with two to four hospitals that drew more than 10 percent of their patients from surrounding communities. The resulting markets defined by the Elzinga-Hogarty patient flow method included many hospitals from well beyond the metropolitan areas, making it appear that the merging hospitals had small market shares.

Making an analogy between the flows of coal and flows of patients, both the DOJ and the defendant hospitals used flow analysis in the *Rockford* case. The defense presented evidence that, they contended, supported a ten-county geographic market, showing that both inflows and outflows for that area were high. Using the defense’s own data, the government showed that a three-county area that included the merging hospitals achieved nearly the same outflow statistic as, and a higher inflow statistic than, the defendants’ proposed ten-county market area.³

Noting that the addition of seven other counties did little to improve either flow measure, the court rejected the inclusion of those counties in the merging hospitals' market area. Instead, the court limited the relevant geographic market to the county in which the merging hospitals operated, plus a set of zip codes from adjacent counties that contributed nontrivial numbers of patients to the Rockford area. The result defined a market accounting for 87.3 percent of the defendants' admissions and containing only six hospitals. Thus the change in concentration resulting from the merger of two of the larger hospitals in this market exceeded acceptable thresholds (in which the merger of two hospitals among six equal-sized competitors would be considered suspect).

Defining the geographic market was the most contentious part of the trial and was discussed extensively in the district court's subsequent ruling. Once the market was determined, the remainder was a fait accompli. In the court's market, the defendants' combined share was between 64 and 72 percent, depending on whether shares were computed based on beds, admissions, or patient days. A long history of antitrust cases supports the judge's ruling that postmerger market shares of that magnitude are anticompetitive and illegal.⁴

After losing in district court, the hospitals appealed on two grounds: (1) that the DOJ lacked jurisdiction over nonprofit entities and (2) that the geographic market used by the district court was incorrect and too narrow. The appellate court rejected the first claim, despite evidence presented by the hospital's expert that nonprofits do not exploit market power (Lynk 1995), evidence later rejected by other economists (Dranove and Ludwick 1999; Keeler, Melnick, and Zwanziger 1999). (Nonprofit status played a major role in a later case involving hospitals in Grand Rapids, Michigan.) While acknowledging that the market defined by the district court was not perfect, the appellate court reviewed the flow analysis and determined that the defendants' proposed ten-county area was "ridiculous" and rejected the appeal.⁵ Because *Rockford* was the first case to be heard at the circuit level and because the U.S. Supreme Court declined the defendants' request for review, the flow analysis that figured so prominently in that case became the standard for defining geographic markets in hospital merger cases.

Shortly after the appellate court issued its *Rockford* decision (though not necessarily as a result of the decision), a major wave of consolidation began sweeping the hospital industry. Although the antitrust agencies successfully blocked one more merger after *Rockford*,⁶ they lost

six cases in a row between 1994 and 1999.⁷ In all but one of these cases, a primary reason the government lost was the courts' acceptance, based on an Elzinga and Hogarty-style flow analysis, of expansive market definitions. For example, the courts permitted the merger of the Long Island Jewish Medical Center and the North Shore Health System (both located on Long Island) on the grounds that the geographic market included much of New York City. Another example from the state courts was a merger between California's Alta Bates Hospital in Berkeley and Summit Hospital in Oakland that was allowed after the hospitals showed that more than 10 percent of the residents of the San Francisco metropolitan area's East Bay traveled outside the East Bay for care. Indeed, according to the Elzinga and Hogarty criteria, it is difficult to find any suburban regions of large metropolitan areas that constitute, by themselves, well-defined geographic markets. Nor do many smaller metropolitan areas constitute Elzinga and Hogarty-defined markets. In one illustrative analysis, Frech, Langenfeld, and McCluer (2004) showed that Elzinga and Hogarty's methods lead to the absurd conclusion that the entire state of California is a single market. Thus, as long as courts relied on Elzinga and Hogarty to define markets, it appeared that virtually all hospital mergers would be safe from federal antitrust enforcement.

In a handful of antitrust cases (including, but not limited to, merger cases), the defending hospitals have used a methodology known as *critical loss*, which is related to Elzinga and Hogarty's analysis. In critical loss analysis, the economics expert computes how many patients the merging hospitals would have to lose for a price increase of, say, 5 percent, to be unprofitable: this is the "critical loss." The expert then argues that the hospitals would, in fact, lose even more patients. Critical loss shares some of the flaws of Elzinga and Hogarty's analysis and, if anything, generates somewhat larger geographic markets. Critical loss is rarely, if ever, suitable for defining relevant geographic markets for inpatient hospital services (Danger and Frech 2001; Katz and Shapiro 2003; Langenfeld and Li 2001; O'Brien and Wickelgren 2004).

The issue of geographic market definition has been central to other hospital antitrust challenges. Numerous antitrust actions have targeted hospitals for "exclusionary" conduct, including granting exclusive staff privileges to a single specialty group and signing exclusive contracts with payers to be the sole providers of specific services like ambulatory surgery. As in merger cases, hospitals have successfully defended

themselves from allegations of exclusionary conduct by appealing to Elzinga and Hogarty's analysis. Accordingly, by accepting Elzinga and Hogarty, courts in exclusionary conduct cases have concluded that hospitals compete in broad geographic regions and therefore lack the market power required to engage in anticompetitive behavior. This is usually sufficient for hospitals to successfully defend the charges against them.

Given the difficulty of overcoming the Elzinga and Hogarty hurdle, by the end of the 1990s the antitrust agencies' enthusiasm for pursuing hospital merger cases was at its nadir. The lull in enforcement activity thus provided a window for observing the actual results of the earlier contested mergers: Did prices rise faster at the consolidating hospitals than at other hospitals? Were health plans able to steer their enrollees away from merging hospitals to more distant hospitals in response to price increases? Were the hospitals more efficient after the merger? Anecdotal and empirical evidence increasingly suggest that the answers are yes, yes, and usually not.

For example, two California hospital systems with substantial market shares in narrow geographic areas, Sutter Health and Adventist Health, threatened to cancel their contracts with Blue Cross if they did not receive significant reimbursement increases. Press reports indicate the hospitals were seeking increases of 20 to 30 percent (Robertson 2001a, 2001b). In 1993, Massachusetts General Hospital joined forces with the teaching hospitals associated with Harvard University, including Brigham and Women's Hospital, to form the Partners Health Care System. John McArthur, who was the dean of the Harvard Business School and chairman of the Brigham and Women's board, felt that the combination would increase the hospitals' market power (Blumenthal and Edwards 2000). Indeed, Partners used its newfound power to extract price increases from health plans that had previously negotiated discounts. The FTC produced key evidence in the Evanston/Northwestern Healthcare case that the hospitals had substantially raised their prices after their merger, with no evidence that these increases resulted in a loss of patients. Most recently, a report by an FTC staff economist found evidence of substantial and significant price increases in the wake of the aforementioned Alta Bates/Summit merger (Tenn 2009).

Systematic research indeed confirms that mergers lead to higher prices. Vogt and Town reviewed this evidence and concluded: "Research suggests that hospital consolidation in the 1990s raised prices by at least 5 percent and likely by significantly more" (Vogt and Town 2006, p. 4).

For example, a study by Capps and Dranove found that a typical “4 to 3” merger that might pass scrutiny under patient flow analysis would cause a price increase of 5 to 10 percent or more (Capps and Dranove 2004). In another example, Dafny (2009) used an instrumental variables model to show that mergers of neighboring hospitals facilitate double-digit price increases.

A rising chorus of complaints from economists and health care payers amid the mounting evidence that mergers may be contributing to health care cost inflation has led to renewed interest in health care antitrust. In a speech in November 2000, Tim Muris, FTC chairman, outlined the FTC’s plan of action:

Obviously, the template for trying hospital merger cases that was used with such great success in the 1980s and early 1990s no longer works. Although some have suggested that the Commission should just fold its tent and ignore hospital mergers, I do not believe that response is acceptable.

Accordingly, last summer, the Commission established a new merger litigation task force. The task force will screen targets, select the best cases, *and develop new strategies for trying them.* (Muris 2002, italics added)

Thus, the FTC explicitly insists that if new cases prove to be warranted, new strategies would be imperative.

The FTC used the Evanston/Northwestern Healthcare case as an opportunity to “bury the past” by discrediting Elzinga and Hogarty’s analysis. Testifying on behalf of the FTC, Kenneth Elzinga himself questioned the use of the Elzinga and Hogarty methods for assessing hospital mergers. Elzinga observed that the hospital market is differentiated, whereas coal is homogeneous. Further noting that travel by some patients does not imply anything about the demands of the “silent majority” who do not travel, he concluded that patient flow analysis was inappropriate for defining geographic markets (Capps et al. 2002).

Elzinga’s testimony thus raises the question, “If not patient flow analysis, then what?” Several economists have provided an answer in their recent research. In particular, Town and Vistnes (2001) and Capps, Dranove, and Satterthwaite (2003) recommended a new intuitive approach focusing on negotiations between managed care purchasers and hospitals. This approach was embraced by the FTC in the Evanston/Northwestern

Healthcare case. Town and Vistnes and Capps, Dranove, and Satterthwaite also introduced an empirical framework for studying the effects of market power on these negotiations, and the Capps, Dranove, and Satterthwaite methodology was adopted by the FTC in the Inova cases and also by the Netherlands Competition Authority.⁸ Capps, Dranove, and Satterthwaite developed and validated empirical methods for defining geographic markets that capture three essential facts about hospital pricing: (1) hospital services are differentiated, in the sense that different hospitals offer different services, such as neonatology and transplantation, and may also serve different local populations; (2) prices are ultimately determined by negotiations between hospital and insurer; and (3) insurers negotiate on behalf of employers and employees who may not know their exact medical needs at the time they select a health care plan. Capps, Dranove, and Satterthwaite derived from economic principles a measure of the value that each hospital brings to the enrollees in a managed care plan, measured at the time the enrollees are choosing their plan, that is, before they know their specific medical needs. This measure of enrollees' ex ante utility of including a hospital in the managed care plan's network is referred to as the *willingness to pay* (WTP) for that hospital. Capps, Dranove, and Satterthwaite showed that WTP was strongly and positively correlated with a hospital's profits, indicating that hospitals with a higher WTP were able to command higher prices from health plans.

We believe that the WTP method proposed by Capps, Dranove, and Satterthwaite (or related methods) has the potential to change the face of health care antitrust. Consider the recent FTC action against Evanston/Northwestern Healthcare. The FTC had the benefit of its retrospective pricing study showing that Evanston/Northwestern Healthcare raised its prices after the merger. This obviated the need for using market definition as the basis for computing market shares and predicting price changes. Even so, the FTC's economic expert augmented the retrospective price study with an intuitive analysis that emphasized bargaining by the insurer and hospital, as suggested by Capps, Dranove, and Satterthwaite. This analysis argued in favor of defining a small geographic market confined to a portion of the northern Chicago suburbs. Moreover, when describing the problem of the "silent majority," Elzinga quoted directly from the title of the precursor to Capps, Dranove, and Satterthwaite's analysis (Capps et al. 2002). Consider, too, the expansion by Inova in Virginia. Using Elzinga and Hogarty's methods, a court

might have accepted that the entire Washington, D.C., metroplex was a market and that Inova lacked power in this broad market. The FTC expert economist rejected flow analysis and used Capps, Dranove, and Satterthwaite's statistical methods to argue persuasively that the northern Virginia suburbs were a distinct market dominated by Inova. Inova dropped its expansion plan rather than fight a legal battle, but the tide seems to be turning in favor of smaller geographic markets.

The Willingness-to-Pay Approach

The willingness-to-pay (WTP) approach to defining hospital markets is derived from the antitrust guidelines established by the DOJ and FTC in 1997. The agencies recommended that in merger analysis the market definition be based on the *small but significant nontransitory increase in price* (SSNIP) criterion (U.S. DOJ/FTC 1997). Under SSNIP, a narrow, trial-market definition is initially proposed. If the hospitals in the trial market can collusively raise prices and implement a SSNIP (usually regarded as a 5 percent price increase sustained for at least one year), then the market is well defined and these hospitals constitute the relevant set of competitors. If they cannot do so, then hospitals outside the trial market must be exerting competitive pressure. In this way, the market definition is expanded to include the next closest hospitals. The process is iterated until the SSNIP criterion is met. At that point, the geographic market is regarded as well defined. The economist then produces some measure of market concentration such as the Herfindahl-Hirschman index (HHI) (U.S. DOJ/FTC 1997). If the merger would cause a substantial increase in the HHI, the court would have grounds to block the merger.

The SSNIP criterion also can be applied to exclusionary conduct cases (e.g., tying and exclusive dealing), in which an essential step is establishing that the defendant has monopoly power. The analyst can use the SSNIP to define the overall market and then use market shares as one way to establish the defendant's monopoly power.

In order to implement the SSNIP criterion, the analyst must answer the counterfactual "How much would prices rise in the event that all sellers conspired?" Traditionally, some insight into this counterfactual would be gained using the Structure-Conduct-Performance framework relating prices to some measure of market structure like the Herfindahl-Hirschman index (Weiss 1989). This approach, however, has been

criticized for failing to deal appropriately with the endogeneity of market structure, specifically the possibility that markets become concentrated because the biggest firms excel at meeting consumers' needs. Moreover, to implement this approach, the market still must be defined. In the past two decades, industrial organization economists have introduced structural approaches to forecasting price increases (e.g., Scheffman and Spiller 1987), which directly model the processes by which firms compete. Structural models can be used to define markets by implementing the SSNIP and also to estimate directly the price effects of mergers without explicitly defining a market.

Town and Vistnes (2001) were the first to use structural modeling to analyze bargaining between hospital and insurer.⁹ Capps, Dranove, and Satterthwaite (2003) then built on Town and Vistnes, developing a model that predicts pricing in "option demand" markets, markets in which a financial intermediary assembles a network of sellers that make their services available to consumers.¹⁰ The intermediary and the sellers negotiate before consumers realize their specific needs. This is a reasonable characterization of managed care markets, in which health plans selectively contract with a network of hospitals and patients must select their health plan (and corresponding network) before knowing their specific health needs. The Capps, Dranove, and Satterthwaite model is then used to assess the SSNIP criterion and thereby define the market. In this way, Capps, Dranove, and Satterthwaite replaced Elzinga and Hogarty for geographic market definition. The Capps, Dranove, and Satterthwaite model also can be used to predict pricing changes after the merger and thus can be used to assess merger effects without a market definition. The remainder of this section is a general overview of the Capps, Dranove, and Satterthwaite approach to estimating WTP in the context of selective contracting. In the next section, we present more details of the approach in the context of analyzing two hospital mergers.

The Capps, Dranove, and Satterthwaite Approach to Estimating Willingness to Pay

Capps, Dranove, and Satterthwaite begin with a model of hospital demand that they estimate using multinomial choice modeling. They use the parameters from the demand estimate to calculate the crucial

variable in the WTP formulation: the hospital's (or system's) predicted market share in each of hundreds of "micromarkets." A micromarket is a unique combination of patient characteristics that generate unique demand and market share predictions. An example is all patients who are female, Hispanic, older than sixty-five, living in a particular zip code, and diagnosed with a myocardial infarction. Because WTP is based on power in micromarkets, this formula captures such crucial distinctions as whether a hospital is very strong in its local community for obstetrics but weak in most types of cardiac care. It also accounts for the importance of the treatment of different clinical conditions. Capps, Dranove, and Satterthwaite demonstrated that the WTP for a system of hospitals is larger than the sum of the WTP of each individual hospital. The difference between the WTP of the system and the sum of the WTPs of the individual hospitals is the incremental WTP from the merger. If two hospitals are close substitutes—that is, if they serve overlapping micromarkets—the incremental WTP from a merger will be larger than if their micromarkets are largely distinct.

Capps, Dranove, and Satterthwaite established whether mergers increased the joint WTP of the consolidating hospitals. In order to translate WTP to price changes and assess the SSNIP criterion, Capps, Dranove, and Satterthwaite used a simple bargaining framework in which the price that a hospital or hospital system commands depends on its WTP. By regressing prices (or profits) on WTP, Capps, Dranove, and Satterthwaite can predict the price increase from a hypothetical merger, as required by the SSNIP test. In ongoing research, we are refining the bargaining model in order to derive more accurate pricing predictions.

The Capps, Dranove, and Satterthwaite methods have been validated in their original article, in ongoing research, and by Fournier and Gai (Fournier and Gai 2006). These studies suggest that WTP is a valid predictor of a hospital's/system's profits from privately insured patients. Capps, Dranove, and Satterthwaite show how to convert the profit estimates into prices.

Application of the WTP Approach

We do not believe it would be appropriate to illustrate WTP using data from actual court cases, so we instead apply the method to a pair of consolidations recently proposed by a New York regulatory agency.

(One of the proposed consolidations took place, but the other was abandoned.) On November 28, 2006, the New York State Commission on Health Care Facilities in the 21st Century (CHC) released a plan to restructure the state's health care system. The Plan to Stabilize and Strengthen New York's Health Care System recommended the elimination of roughly 4,200 hospital beds statewide, the closure of several poorly performing hospitals, and the mergers of several other hospitals. The commission justified these actions on several grounds: first, that excess capacity reduces quality by reducing the patient volume of each facility; second, that excess capacity leads to the overutilization of beds and services as hospitals seek to cover their costs; third, that services in some communities are unnecessarily duplicated at different hospitals (the "medical arms race"); and fourth, that the cost of maintaining empty beds is passed through to the state in higher Medicaid payments (CHC 2006). The CHC's recommendations began taking effect on July 1, 2008.

In pursuit of its goal of eliminating New York State's excess capacity, the commission sought to reduce significantly the number of hospitals in some areas of the state. For instance, two of the four hospitals in Syracuse were merged; two of the three hospitals in Ulster County were merged; and two of the four hospitals in Schenectady were merged and one of the other two hospitals was closed. Although the report also recommended merging the only two hospitals in Elmira, after several months of talks, the hospitals declared that they were unable to merge and this recommendation was not carried out.

In any other market, such increases in concentration would raise eyebrows, as reducing the number of local competitors from four to three or even from two to one would surely warrant antitrust scrutiny. If evaluated using the Elzinga and Hogarty criterion, the Elmira merger might be problematic, but the Syracuse merger would almost surely gain approval. We explored what would happen using the WTP criterion, focusing on two recommendations for central New York:

1. In Syracuse, Crouse Hospital and University Hospital should merge, with the combined entity converting to a private nonprofit hospital. This merger has been carried out.
2. In Elmira, St. Joseph's Hospital and Arnot Ogden Hospital should merge. But it appears that this merger will not be

concluded, for idiosyncratic reasons that have nothing to do with antitrust.

The CHC offered several justifications for the merger of Crouse and University hospitals. First, the campuses are adjacent and, in some places, are physically connected. Second, both hospitals serve important educational roles for the SUNY Upstate Medical University. Third, at the time of the report, while University was operating at 80 percent occupancy, Crouse was operating at only 60 percent occupancy and filed for bankruptcy protection in 2001 (although it is no longer threatened financially). Finally, University was undergoing a \$99-million expansion project, while Crouse was planning an \$88-million modernization of its facilities. Some of the renovations of each hospital would duplicate services found in the other hospital. Thus, ignoring competitive issues, a merger of these two hospitals could result in cost savings for the combined entity.

The merger of St. Joseph's Hospital and Arnot Ogden Hospital in Elmira was somewhat harder to justify. The CHC stated that the two hospitals were operating at 61 percent capacity and 63 percent capacity, respectively, and that both experienced slight financial losses between 2001 and 2003. The report did not suggest that either hospital was in imminent danger of bankruptcy. Instead, the merger recommendation appeared to be based largely on the fact that the two facilities operate many of the same services and that each hospital had tried to add new services already provided by the other hospital (i.e., a "medical arms race" argument).

We estimated the WTP model for both of these mergers using patient discharge records collected as part of the Healthcare Cost and Utilization Project. Specifically, we used the State Inpatient Database (SID) for New York State for the year 1999. The SID contains a record of all hospital discharges in the state in each year. Following Capps, Dranove, and Satterthwaite, we identified each patient's choice set by taking the point of view of an employer/health plan assembling a network on behalf of a local population. Thus, we included in each patient's hospital choice those hospitals in the Syracuse metropolitan area, Elmira, and the surrounding cities (including Ithaca, Cortland, and Auburn). Marginal changes to these boundaries did not affect our conclusions. We used the 1999 SID because these data were already available in-house. In our experience, market definitions do not vary much over time.

The patient records include such items as age, sex, race, diagnoses, treatments performed, zip code of primary residence, and the ID number of the hospital in which the patient was treated. Although the records do not contain any information about the patients' income (beyond what may be inferred by their insurance status), income may be an important determinant of hospital choice. We therefore included as a patient characteristic the median income of the patient's home zip code, which we obtained from the 2000 census.

We obtained hospital characteristics from the Medicare Prospective Payment System data. These characteristics include teaching status and the presence of various services, such as cardiac catheterization and obstetrics. The final variable in this analysis was the travel time between the patient's home zip code and the hospital. Because hospital markets are defined geographically, travel time is necessary to conduct any sort of patient flow analysis. We obtained travel time using the driving time calculator on Mapquest.

Our analysis model was a logit choice model with the following set of regressors: travel time, hospital characteristics, and the interactions between the two; and the patients' age, sex, race, median local income, and major diagnoses interacted with hospital characteristics. The set of hospital characteristics are teaching status and indicators that the hospital offers services in neurology, orthopedics, cardiac care, respiratory care, obstetrics, and transplants. The latter were combined with the patients' clinical characteristics (to allow for patients with specific medical needs to have stronger preferences for those hospitals equipped to meet them). We excluded price because it generally was unavailable and restricted our attention to patients whose insurance would generally lead to comparable prices across their choice set. Because the purpose of the WTP model is to estimate the value in utils (a measure of the hospital's value relative to other hospitals) that a hospital adds to a network, it is not necessary to include price in the choice model.

Results

The first step in WTP analysis is to estimate a hospital choice model. Individual coefficients are not of independent interest, and we do not report the lengthy results. Interested readers may refer to the Capps,

TABLE 1
Hospitals' Willingness to Pay (WTP)

Name	City	WTP
United-Binghamton General	Binghamton	529.65
Our Lady of Lourdes Memorial Hospital	Binghamton	2778.41
United-Wilson Hospital Division	Johnson City	7416.65
Auburn Memorial Hospital	Auburn	2425.41
Arnot Ogden Medical Center	Elmira	4652.00
St. Joseph Hospital	Elmira	947.25
Cortland Memorial Hospital Inc.	Cortland	1626.38
Community General Hospital of Greater Syracuse	Syracuse	4558.17
St. Joseph Health Center	Syracuse	10431.04
University Hospital SUNY Health Science Center	Syracuse	9907.48
Crouse Hospital	Syracuse	18221.80
Albert Lindley Lee Memorial Hospital	Fulton	933.06
Oswego Hospital	Oswego	1588.53
Schuyler Hospital	Montour Falls	3712.38
Corning Hospital	Corning	2231.54
Cayuga Medical Center at Ithaca	Ithaca	5835.42

Dranove, and Satterthwaite (2003) article for an example of the output associated with these choice models.

We used the results of the choice model to compute willingness to pay. Table 1 shows the WTP calculations. These results are in logit utils and are therefore not directly interpretable in terms of hospital prices. They can be used, however, to show the value that each hospital brings to managed care payers relative to that of the other hospitals in the market. Relative to other area hospitals, the most valuable hospitals are University, Crouse, and St. Joseph's in Syracuse. This result is hardly surprising, since Syracuse is a population hub and these are the best-equipped hospitals in the city. Outside Syracuse, the most valuable hospital is United-Wilson in Johnson City.

The simplest way to convert the WTP into dollars is to regress profits on WTP. The regression of profits on WTP should include only the profits and WTP derived from privately insured patients because Medicare and Medicaid rates are effectively fixed, regardless of the WTP for those groups of patients. Capps, Dranove, and Satterthwaite were able to do this for San Diego hospitals because California lists private and public revenues separately. This is not generally feasible for other states,

TABLE 2
Profit Regression Results

Variable	Coefficient
WTP	1027.18 ($p = 0.02$)
Medicare Diagnostic-Related Groups	-139.67 ($p = 0.68$)
Medicaid Diagnostic-Related Groups	-9505.76 ($p = 0.00$)
R-squared	0.81

including New York. We therefore used an alternative approach, which gives results consistent in magnitude with those in Capps, Dranove, and Satterthwaite's study.

New York State makes available each hospital's total revenues, costs, and income. The state financial reports do not, however, break down costs and income for each insurance group. In order to estimate the incremental profits from private patients, we regressed total hospital profits for the hospitals in our study region on privately insured patients' WTP, the sum of the diagnosis-related group (DRG) weights for all Medicare patients, and the sum of the DRG weights for all Medicaid patients. We estimated this equation using profits and patient data from 1999. Our implicit assumption is that the profitability of a Medicare patient with a given DRG weight is constant across hospitals; likewise for Medicaid.

Table 2 contains the results of the profit regression. WTP is positive and significant, Medicaid is negative and significant, and Medicare is negative but insignificant. These are consistent with conventional wisdom about the relative profitability of each class of patient.

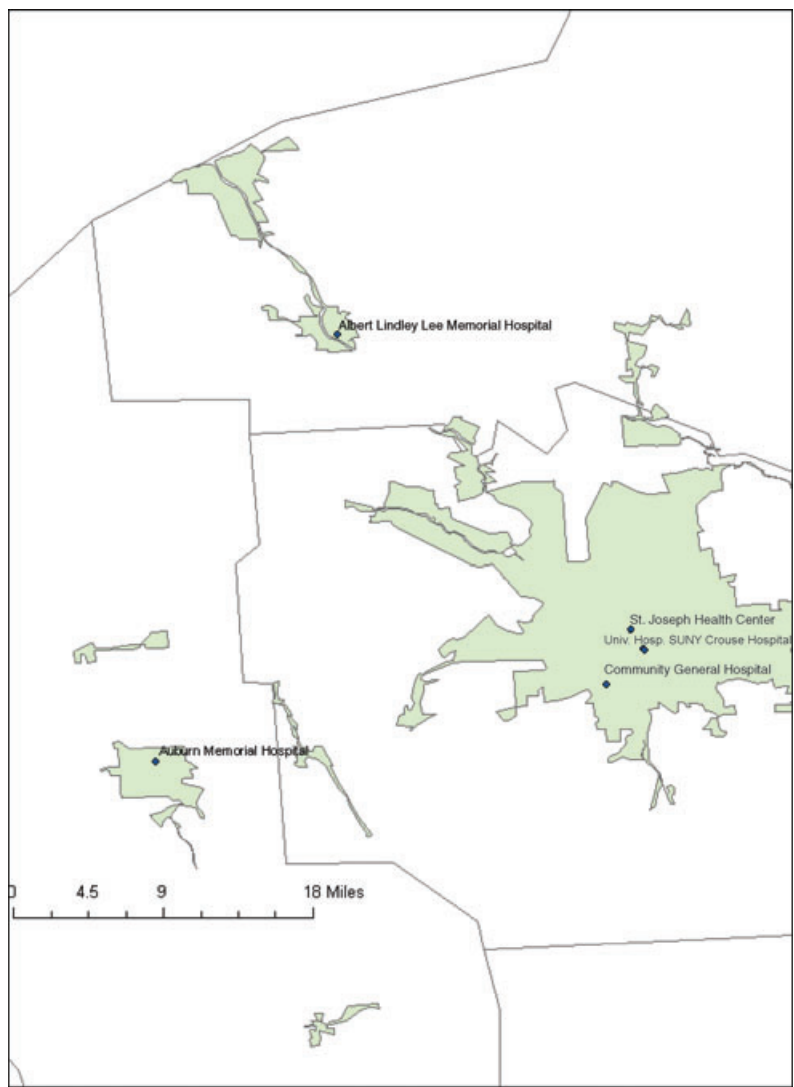
These results tell us how additional units of WTP translate into increased profits from privately insured patients. In order to translate this into a percentage price increase, we need some estimate of the initial price level for private patients. Our data permit us to compute the average payment per admission for all patients in a hospital in New York but do not permit us to compute the price for each payer category. To get a sense of relative prices by category, we computed a rough estimate of the private price using financial records for the 1999/2000 fiscal year

TABLE 3
Syracuse and Elmira SSNIP Calculations

	Results
Elmira (2 Hospitals)	
Sum of WTPs	5599.25
Simulated merger WTP	8175.90
Percentage increase in WTP	46%
Increase in profit	\$2,646,683
Increase in price	\$761.42
Percentage increase in price	8%
Syracuse (3 Hospitals)	
Sum of WTPs	38560.32
Simulated merger WTP	71434.28
Percentage increase in WTP	85%
Increase in profit	\$33,767,474
Increase in price	\$1720.46
Percentage increase in price	16%

from California, from which we could determine the ratio of average private payer price to average price for all patients. The California data show that the median private payer price is about 85 percent of the median total price. We make the admittedly bold assumption that a similar ratio would apply in New York. In a real antitrust case, the actual prices in New York would be obtained through the discovery process.

With these final steps in hand, we were able to conduct the SSNIP analyses as well as directly assess the effects of the merger. Table 3 shows the results of the SSNIP analysis for Syracuse and Elmira. Although Syracuse contains a total of four hospitals, University, Crouse, and St. Joseph's have substantially higher WTPs than Community General. We therefore tested whether a hypothetical merger of these three hospitals would exceed the 5 percent SSNIP threshold. The SSNIP analysis of a hypothetical merger of these hospitals forecasts a price increase of 16 percent, well above the DOJ/FTC SSNIP threshold. Thus, these three hospitals in Syracuse are a well-defined geographic market. The proposed merger would essentially reduce the number of competitors to two, and the resulting change in concentration would exceed antitrust thresholds. The forecasted price increase for Elmira also would exceed the 5 percent SSNIP threshold, and therefore Elmira also is a well-defined market

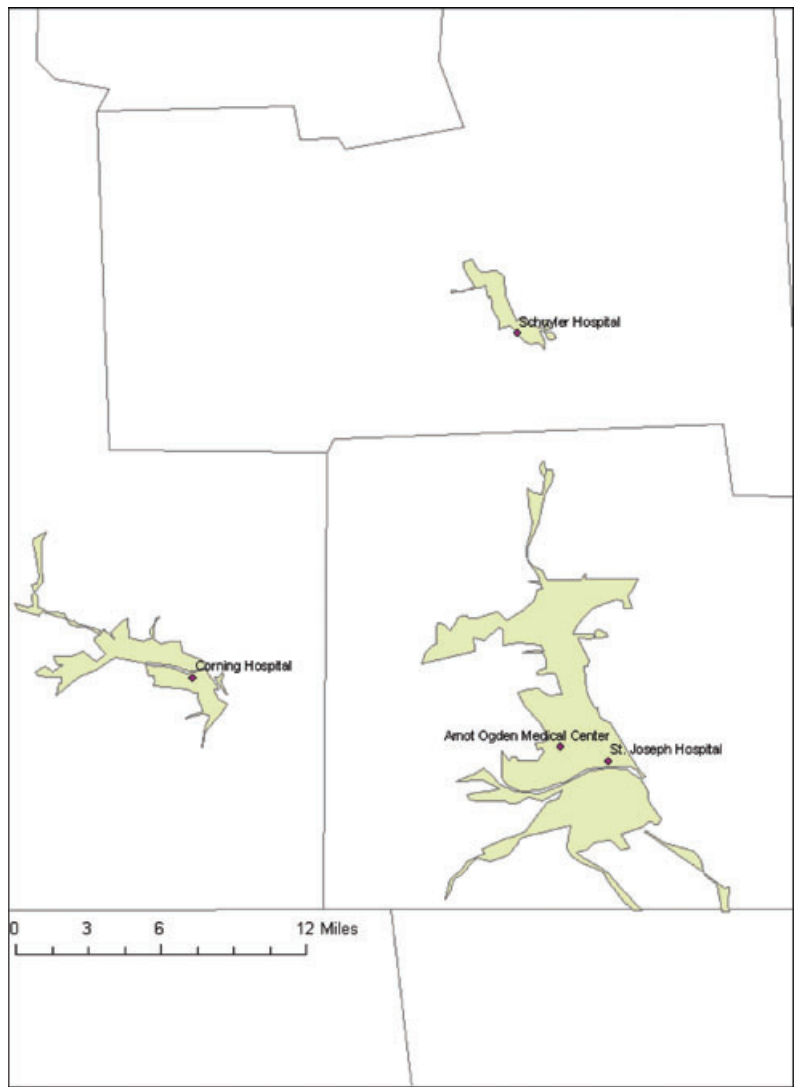


Note: Shaded areas are cities; Elzinga-Hogarty includes all hospitals shown; WTP includes only St. Joseph, SUNY, and Crouse.

FIGURE 1. Syracuse-Area Hospitals

containing only these two hospitals. Based on the WTP method, this merger to monopoly would be carefully scrutinized.¹¹

Figure 1 shows the hospitals in the Syracuse market using the Elzinga and Hogarty and WTP definitions. The WTP market contains only



Note: Shaded areas are cities; Elzinga-Hogarty includes all hospitals shown; WTP includes only Arnot Ogden and St. Joseph.

FIGURE 2. Elmira-Area Hospitals

the three largest hospitals in the city of Syracuse, while the Elzinga and Hogarty market also contains Community General, Albert Lindley Lee, and Auburn hospitals. Figure 2 shows the hospitals in the Elmira market. The WTP market contains only the two hospitals in the city of

Elmira, while the Elzinga and Hogarty market also contains Schuyler and Corning hospitals. Thus in both cases, the WTP market is smaller than the Elzinga and Hogarty market. In both Syracuse and Elmira, the hospitals included under Elzinga and Hogarty but excluded under WTP are smaller than the hospitals included in both. The hospitals in the WTP market areas also offer more services, such as cardiac catheterization and neonatal intensive care. In addition, with the exception of Community General Hospital in Syracuse, the hospitals excluded from the WTP market are outside the major city.

Although the merger guidelines rely on concentration indices once a market has been defined, our method does not require that these indices be used. Using the WTP method, we can directly calculate the expected price increase from a two-hospital merger. In the case of Elmira, the two hospitals in the market would merge to monopoly, and our model predicts an 8 percent increase in prices. But our model predicts that the merger of Crouse and University in Syracuse would lead to only a 2 percent increase in prices, as these hospitals are apparently constrained by the other hospitals in the market.

What about Efficiencies and Quality?

In a typical merger case, projected price increases are weighed against potential efficiency gains or quality improvements. The courts are generally skeptical of efficiency arguments, given that most blatantly anticompetitive mergers are usually “justified” on the grounds of hypothetical efficiencies. In reviewing the research evidence, Vogt and Town (2006, p. 9) found slightly favorable evidence of efficiencies and concluded, “The balance of the evidence indicates that hospital consolidation produces some cost savings and that these cost savings can be significant when hospitals consolidate their services more fully.” This suggests that efficiencies can arise from clinical integration.

The courts also have been hesitant to entertain evidence of potential quality enhancements. Here again, potential benefits may depend on clinical integration. Specifically, numerous studies document a correlation between volume and outcomes for a wide range of procedures and services, although few studies definitively sort out competing “learning by doing” and “selective referral” explanations.¹² Even if we accepted

that this correlation implies learning by doing, achieving learning benefits through consolidation has at least two additional requirements:

- Consolidation must concentrate service provision among a smaller number of hospitals. In many hospital mergers, each hospital retains its premerger service offerings, thereby limiting its ability to achieve learning benefits.
- Learning benefits will accrue to hospitals, as opposed to individual physicians. The limited research on this topic suggests that learning is specific to the doctor, rather than to the hospital, or sometimes specific to the doctor/hospital pair (see Huckman and Pisano 2006; Ramanarayanan 2009). If this is the case, then consolidation must concentrate service provision among doctors and not just hospitals.

These are stringent requirements, which may explain why after Vogt and Town (2006, p. 8) reviewed the evidence on mergers and quality, they concluded: “A slim majority of studies finds that, at least for some procedures, increases in hospital concentration reduce quality. The strongest studies confirm this result.”

Even the most favorable view of mergers holds that clinical integration is a necessary but not sufficient condition for achieving substantial cost savings and quality improvements. We examined the Elmira and Syracuse mergers to ascertain whether either consolidation offered the potential for clinical integration. The Elmira hospitals had little overlap in the complex services usually associated with clinical integration cost savings and quality enhancements. For instance, only Arnot Ogden offers open-heart surgery, cardiac catheterization, and neonatal intensive care. In Syracuse, both University and Crouse offer cardiac catheterization and some types of heart surgery. Only one of the two hospitals, however, offers other complex services, such as transplant services and neonatal intensive care. Thus, opportunities for cost savings and quality enhancements appear to be limited. Even so, it is possible that if these mergers had been litigated, the hospitals could have demonstrated efficiencies and quality enhancements that more than offset the anticipated price increases.

Merging hospitals have one other potential defense. Specifically, if the hospitals can demonstrate that one of them would have closed because of financial distress, then the courts may well approve the merger.

Discussion

For better or worse, American health policy has been predicated on the success of competitive health care markets inspired by the growth of selective contracting among health plans and hospitals. As described by Dranove, Satterthwaite, and Sindelar (1986), selective contracting can sow the seeds of its own destruction, by encouraging hospitals to consolidate. Although consolidation can, in theory, reduce costs and improve quality, empirical evidence suggests that these desirable goals are infrequently achieved. Research is more compelling in showing that consolidation leads to higher prices. Indeed, ongoing consolidation may be one of the principal reasons why health care costs continue to increase (U.S. DOJ/FTC 2004).

The U.S. Department of Justice and Federal Trade Commission are charged with blocking anticompetitive consolidation, that is, consolidation that will lead to higher profit margins without offsetting efficiencies and quality enhancements. Over the past fifteen years, both the DOJ and FTC have targeted what would seem to be *prima facie* examples of anticompetitive mergers among hospitals. Yet until the recent Evanston/Northwestern Healthcare decision, the DOJ and FTC's track record could not have been more dismal, losing at least six consecutive court battles. Challenges to consolidation of other providers, including seemingly dominant local physician medical practices, have been equally ineffectual.

These repeated failures can be largely traced to the courts' acceptance of methods for geographic market definition that are based on patient flow data, including the Elzinga and Hogarty and critical loss methodologies. These methods invariably define expansive geographic markets in which the merging parties have minuscule market shares. DOJ and FTC experts contended that these methods lacked theoretical and empirical foundations, and published academic studies have made this point. Despite these objections, the courts continued to accept flow analysis until the Evanston/Northwestern Healthcare decision, when Ken Elzinga, one of the Elzinga and Hogarty architects, questioned its use for hospital markets. Although it is premature to lay flow analysis to rest, it surely is on life support. The eventual demise of flow analysis could leave a void in hospital antitrust analysis.

The willingness-to-pay approach fills that void. The method is derived from an economic theory that is tailor-made to fit the institutional details of selective contracting. This makes it theoretically more attractive than previous models. The WTP method generates far smaller geographic markets than does the Elzinga and Hogarty method. In our experience, markets and competitors defined by WTP fit much more closely than Elzinga and Hogarty to the ways that payers and hospitals define their markets and competitors. Thus, WTP has the additional virtue of face validity. And while the underlying mathematics of WTP are complex, they are well within reach of the economic consulting firms that perform expert analyses in antitrust cases.

Hospital antitrust cases hinge on establishing whether the defendant hospital has market power (in merger cases) or monopoly power (in unilateral conduct cases). This, in turn, depends on how the geographic market is defined. If the Capps, Dranove, and Satterthwaite method for using willingness to pay to implement the DOJ/FTC's SSNIP criteria for defining markets proves to be correct—and economic theory and early empirical evidence suggest that it is—then the courts will increasingly accept that hospitals compete in relatively small geographic areas. This will put at risk all hospitals that engage in anticompetitive behavior. Given that antitrust laws expose violators to payments equal to treble the financial damages (i.e., three times the increase in revenue that was supported by the illegal conduct), this is a risk that many hospitals will have to take seriously. A reversal in the consolidation wave would be welcome news to those who support market-based health care reforms.

Endnotes

1. *United States v. Rockford Memorial Hospital Corp.*, 717 F. Supp. 1251 (N.D. Ill. 1989), *aff'd*, 898 F.2d 1278 (7th Cir.), *cert. denied*, 498 U.S. 920 (1990).
2. Elzinga and Hogarty (1973) first played a major role in a hospital case in *In re HCA*, 106 F.T.C. 361 (1985), in which HCA was ordered to divest a number of hospitals.
3. 717 F. Supp. 1251 (N.D. Ill. 1989) at 62.
4. "Further, whereas the two largest hospitals in the geographic area control between them approximately 64 percent of the area's inpatient hospital business, the two largest after the merger will control 90 percent. This increase in concentration must be regarded as significant. Nor is there anything in the record of this case to rebut the inherently anticompetitive tendency manifested by these percentages." 717 F. Supp. 1251 (N.D. Ill. 1989) at 135.
5. 898 F.2d 1278 at 21.

6. *FTC v. University Health, Inc.*, 115 FTC 880 (1992) (consent order).
7. *United States v. Mercy Health Services et al.*, 902 F. Supp. 968 (N.D. Iowa 1995), vacating as moot, 107 F.3d 632 (8th Cir. 1997); *Ukiah Adventist Hospital v. FTC*, No. 93-70387 (9th Cir. May 18, 1994); *FTC v. Freeman Hospital*, 1995 Trade Reg. Rep. 23,775, aff'd. 69 F.3d (8th Cir. 1995); *FTC v. Tenet Health Care Corp.*, 186 F. 3d. 1045 (8th Cir. 1999); *FTC v. Butterworth Health Corp.*, 946 F. Supp. 1285 (W.D. Mich, 1996) aff'd. 121 F. 3d 708 Decision published without opinion (6th Cir. 1997); *U.S. v. Long Island Jewish Medical Center*, 983 F. Supp. 121 (E.D.N.Y. 1997). A seventh loss occurred at the state level in *California v. Sutter Health System*, 130 F.Supp.2d 1109 (N.D. Cal.), aff'd, 217 F.3d 846 (9th Cir. 2001), again in large part on the grounds of market definition. In most of these cases, the federal agencies argued against using flow analysis to define markets.
8. See Capps et al. 2002; Capps, Dranove, and Satterthwaite 2003. The Netherlands is partially deregulating its hospital market and is developing rules for antitrust. We have worked with the Netherlands Competition Authority in this endeavor.
9. Gaynor and Vogt (2003) develop a structural model of hospital pricing but do not directly consider the role of hospital-insurer negotiation.
10. Ho (2009) builds on Town and Vistnes and CDS by directly considering the role of hospital capacity in insurer-hospital negotiations.
11. In order to test the statistical significance of these mergers, we performed a bootstrap of the conditional logit model and then used each estimated parameter vector from the bootstrap to recalculate the expected increase in willingness to pay from a hospital merger. We performed sixty-six repetitions. In all cases the WTP was positive, indicating that our estimate is significantly different from zero. Note that the 5 percent threshold is used only to define markets. Market power is usually based on market shares within markets, although WTP also may be used to predict price increases.
12. The seminal paper may be that by Luft, Hunt, and Maerki (1987), which documents the correlation for more than a dozen surgical procedures. Although Luft and colleagues attempt to sort out causality, it is difficult to assess the validity of their instruments. Subsequent studies, including that by Halm, Lee, and Chassin (2002), which is a major review of the literature, do not attempt to sort out causality. Exceptions are those by Gaynor, Seider, and Vogt (2005); Gowrisankaran, Ho, and Town (2006); Sfekas (2009); and Ramanarayanan (2009). Of these, Ramanarayanan and Gowrisankaran and colleagues document a causal relationship running from experience to outcomes, whereas Gaynor and colleagues and Sfekas find no effect of volume on mortality.

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